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EXAMINER	
PADGETT, MARIANNE L	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/789,020	Applicant(s) SIEGEL, STEPHEN B.
	Examiner Marianne L. Padgett	Art Unit 1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,10-14,16,18 and 22-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,10-14,16,18 and 22-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. Applicant's amendment of the drawings, specifically figure 4, has corrected the problem in the disclosure with respect to reference numbers associated therewith, as discussed in section 3 of the 3/17/2006 action. Applicant may wish to note & correct the second to last paragraph on page 15, which ends in two periods.

The claims have been amended to employ the term "uniformly" in a more precise manner than was previously employed in the claims of the 6/1/2005 amendment, especially as read light of the specification in the first full paragraph on page 2, which discusses uniformity in a context relevant to the claims as now written, and thus provides more meaning to the claims.

Applicant's 8/14/2006 amendment contains several noncompliant informalities, specifically in the independent claims 1 & 13, the word "particular" before "UV curable ink" is underline, when it was previously inserted in those locations in these claims in the 2/24/2006 amendment. Also in claim 13, the hyphen, "-", after "diode" in line 3, has been informally deleted, noting that it has been there continuously from the original claims, and was even apparently lengthened in one of the amendments. There are also several deleted words under five characters which stand-alone, and should have been deleted using double brackets for clarity, i.e. see "sets" in claim 13 lines 3 & 9. As the examiner does not believe that any of these problems will cause further problems later in the case, no notice of noncompliance has been sent out.

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. The amendment filed 8/14/2006 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: in paragraphs on pages 3-4 & 8-9.00000, applicants have changed "non-oxygen" to "non-oxidizing", which while of overlapping scope are different scopes, but in the remarks on page 11 of the 8/14/2006 response, they have provided no reasons why the specification necessarily as originally filed supports this amendment. While the amendment indeed corrects the contradictory statement on page 8 of "non-oxygen containing gas, e.g., carbon dioxide", the exemplary gas of CO_2 is not necessarily non-oxidizing, as its chemistry is relative to the particular environment in which it is present, including other materials, energy sources present, etc., with it further noted that a generic disclosure of UV curable inks would not appear to provide any reason to necessarily support that CO_2 is necessarily non-oxidizing with respect to all possible compositions that fit this general description, hence changing the specification as discussed above appears to constitute New Matter, unless reasonable explanations are provided as to why the specification as originally filed would necessitate this meaning.

Applicant is required to cancel the new matter in the reply to this Office Action.

4. Claims 1-6, 10-14, 16, 18 & 22-36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 14, line 3 "said sets of UV LED chips" lacks any antecedent basis, as all reference to "sets" has been deleted from independent claim 13 from which claim 14 depends.

In independent claim 1, applicant has deleted the phrasing that defined "LED", hence removing this definition of this acronym from the set of claims, such that it is now again uncertain as written what "LED stands for, i.e. does it mean light emitting diode, or light emitting device, etc.

The claim of "a primary wavelength" that has been added to claims 1 & 13, is ambiguous, since this phrase used in the context of this independent claims, would generally mean that there is a single predominate wavelength employed, i.e. a wavelength that is most important, but in some dependent claims, such as 4 or 16, where multiple wavelengths are required, it could also mean order or simply be a labeling designation, hence the meaning of this phrasing is unclear. It is further noted that pages in the specification, such as 10-11, which discuss use of multiple wavelengths, do not employ this phraseology, hence the phrasing cannot be read in light of the specification.

In new claims 28 & 32 dependent from claims 1 & 13, respectively, there is a claim to "emitting shorter wavelength UV light...", however these claims do not state what the UV wavelength is shorter than, hence constitutes an undefined relative term that lacks clear metes and bounds, so are vague and indefinite. It is noted that the independent claims as presently written are directed to a primary UV wavelength, such that it may be implied that this claim of shorter wavelength UV light from another light source, a shorter than the "primary wavelength" light from the UV LEDs, but an implication is not an explicit claim to a limitation, thus does not provide a proper delineation of scope.

Claims 25-26 & 31 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The independent claim requires that the LEDs emit UV light, with independent claim 1 emitting UV light at a primary wavelength (potentially ≡ main or dominant wavelength), however these claims require that the wavelength be 415 nm, which is not an ultraviolet wavelength, but visible wavelength in the violet region of the spectra, thus these claims do not properly lipid a limitation of the independent claims that requires UV light, not visible. Applicant is directed to review the definition of ultraviolet light as provided on pages 97 & 101 of UV Curing: Science and Technology, by McGuinness, edited by Pappas, from which it is clear that 415 nm is violet visible light, such that one of ordinary skill

in the art when reading the claim directed to UV light would not choose or consider as their primary wavelength light at 415 nm in the visible spectra. It is noted that while applicant provides examples of two wavelengths of violet light at 415 or 420 nm employed with various UV wavelengths on pages 10 & 11, there is no redefinition of the range of ultraviolet light in the specification as originally filed, hence applicant can not be said to have redefined the UV range such that in their specification it differs from the normally excepted range for ultraviolet light. For these reasons, claims 25-26 & 31 do not properly further limit the independent claims requirements that the light be UV, as the specified wavelength is NOT ultraviolet.

5. Claims 1-6, 10-14, 16, 18 & 22-36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The phrasing "a primary wavelength", discussed above in section 4, appears to be inclusive of New Matter, as there was no disclosure found in the specification that taught the primacy of one wavelength over the use of other possible wavelengths. Indeed, the discussions of possible arrangements of assemblies that employ multiple wavelengths (pages 10-11), appeared to give equivalent usage to each wavelength employed, such that no wavelength dominated over another wavelength in use. While it appears possible from the specification that the choice of "primary" to describe wavelength, was an unfortunate alternative choice for --first--, which is used in the specification as a sequential labeling designation, and not to indicate importance, the fact that the term "primary" added by amendment to the claims has multiple meanings and was not used in the original specification, adds additional meaning or scope to the claims, which were not originally disclosed, hence is inclusive of New Matter.

Claims 11-12 & 23-24 appear to contain New Matter, in that the original disclosure found in original claim 11 stated "at least one heat lamp is positioned at the curing station at the entrance end of

the curing station for heating freshly printed ink", which is of a different scope than the new language of claim 11 which requires "heating freshly printed particular UV curable ink with at least one heat lamp prior to irradiating the particular UV ink with UV light", with analogous language found in the other listed claims. Particularly note that "at an entrance end of a curing station", is of more limited, plus overlapping scope, since prior heating while inclusive of being at the entrance end, may be an entirely different station, i.e. not part of the curing station at all, while conversely being at the entrance end does not exclude the IR or heat lamp devices from being mixed with the UV, such that it is not exclusively prior, thus the new scope does not appear to be completely supported, hence appears to include New Matter.

6. Claims 11-12 & 23-24 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

It is noted that original claims 11-12 & 23-24 have limitations to positioning the at least one heat lamp, that may be an IR heat lamp at the entrance of curing station, hence providing only partial support for amendment amended limitation to these claims of "prior to irradiating..." as discussed above, and furthermore, no disclosure was found in the body of the specification to provide a teaching outside the claims for these limitations. Particularly see disclosures on pages 11-12 & figure 11, which relate to use of additional lamps, but these are fluorescent or germicidal lamps, i.e. lamps that admit UV radiation, not IR or for heat, hence the body of specification does not properly provide enablement for the language of these claims.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-6, 10-14,16, 18 & 22-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young (6,561,640 B1), discussed in sections 6 of the 2/1/05 & 8/26/2005 actions, in view of Itou (5,986,682) or Malinen (6,075,595) or Owen et al (2005/0152146 A1, noting provisional parent 60/379,019 with filing date 5/8/2002) for constant intensity, and further in view of Itou or Ignatius et al. (5,278,432) or Vackier et al. (6,525,752 B2) for staggered arrays.

While Young does not teach any "primary wavelength", they do teach the use of multiple wavelengths such that in any arrangement of such multiple wavelengths, one of the wavelengths will have to be used first, thus could be called "primary" ≡ first, covering one possible meaning of applicant's claim language. Neither of the multiple, i.e. pairs of wavelength, etc., employed in Young's process would necessarily be considered dominant over other wavelengths employed, as all of them are important for completing the cure, hence this possible meaning of the claim language, which does not appear to be supported by the specification, is not covered.

Applicants have added new claims to particular wavelengths of light supplied by the UV LEDs, specifically 415 & 370 nm, however choice to use very specific wavelengths of light when no specific material, only the generic claim of "a particular UV curable ink" is made, lacks any special criticality to these particular wavelengths, as they have no specific importance to all UV curable inks, which is the scope of the printing ink claimed. As Young teaches UV LEDs that separately emit different wavelengths, where the UV light is of controlled intensities and duration, and where one is taught to properly select the one or more wavelengths of the light emitting devices to control the effectiveness of the exposure in curing substances according to the substances' photo response and so as to complete the cure using multiple wavelengths (col. 3, lines 45-col. 4, line 60, especially col. 4, lines 28-31, 45-50 & 54-60; etc.), it would've been obvious to one of ordinary skill in the art to employ these teachings to pick specific UV wavelengths, dependent on the particular wavelengths most suitable for curing the UV resin

ink on paper or the like, which would have been expected to be inclusive of the particular wavelengths claimed, depending on particular photoinitiators and resins employed, and for this wavelength's emission devices to be arranged such that all areas to be cured received equivalent proportions of each required wavelength for curing, so as to produce a consistent degree of cure or completion thereof. It is further noted that Young's teachings include choice of different wavelengths for different substances such as different colors of inks and/or four different photoinitiators, such that different photoinitiators can be chosen to make each substance sensitive to different wavelengths (col. 5-6, especially col. 5, line 60-col. 6, line 53), thus it would have been obvious to one of ordinary skill that light sources/wavelengths may be chosen to go with specific photoinitiators, or specific photoinitiators may be chosen to be effective with available light sources, depending on the convenience to the particular practitioner.

Applicant has added new claims to the effect of including another light source of an undefined shorter wavelength, or one that uses one or more germicidal lamps or 254 nm light, however as was discussed in the second paragraph of the discussion in section 6 of the 2/1/2005 action, Young includes the possibility of using additional UV lamps in its mix of different wavelengths for selectively and completely curing the printed inks, where the examiner takes notice that a germicidal lamp is generally one that emits UV wavelengths that are capable of destroying microorganisms so as to act as a disinfectant, thus is only significant to the process in that it is a known lamp that emits another UV wavelength or range of wavelengths, which are consistent with the teachings of Young, hence obvious as a known type of UV lamp, given suggestion of using lamps. It is further noted that again the choice of the specific wavelength 254 nm (which has disclosed in the sixth paragraph on page 11 of the specification may be the peak wavelength omission of a germicidal lamp), is dependent on the composition of the ink & its components photo absorption and photocuring properties, hence would've been obvious options in light of teachings concerning usefulness of lamps, taking into consideration particular compositions.

As was previously discussed, the claims were amended and have been further refine, to further emphasize the use of constant intensity from the LED arrays, and for the light emitted from the LEDs to be uniformly or equally distributed over the surface being cured in so as to produce identical curing in each printed substrate cured. As previously discussed, while Young does not discuss constant intensity from their light source, exactly how the light is distributed or identical degrees of cure from object to object, it is common practice in most manufacturing settings to strive for reproducible results on an assembly line, such as is taught by Young, hence it remains considered obvious to one of ordinary skill in the art when employing the teachings of Young to use the taught control of intensity to maintain that intensity so as to produce the desired amount of radiation to achieve the taught degree of curing for each step when curing the same composition, as this would be a matter of competent workmanship. While Young teaches that intensity is adjustable, that adjustability is in the context of adjusting the intensity for curing different specific compositions, hence one of ordinary skill would expect a competent practitioner to maintain the optimum intensity throughout a curing process, as well as for the entire area requiring curing, and there is no suggestion in the reference that one would not do this. Similarly, there is no suggestion in the reference that one would not be curing like materials to a like degree, and again one of ordinary skill would expect the competent practitioner to be maintaining their conditions, so as to produce the same curing, i.e. reproducible results, with each like article produced or like material cured, as would have been expected in order to meet quality standards, especially high-quality standards. The independent claims now require the UV LED chips to be arranged in staggered rows, which will relate or is relevant to the uniformity claims, although the constant intensity still has no specific steps or means for producing this effect when curing on an assembly line.

The secondary references to Itou (5,986,682) or Malinen (6,075,595) or Owen et al (2005/0152146 A1) provide teachings supportive of the above asserted obviousness. Specifically with respect Itou (abstract; figures 6-9, 15, 36; col. 12, especially lines 3-10 & 29- 64, particularly discussion

of fig. 8; embodiment 2 on col. 16), who teaches LED devices for use as light sources used for "fixing light" on recording paper, it is taught for light emitting devices to be placed in a staggered arrangement on an emitting board, such that the quantity of light is uniform in the direction of the width of the recording paper due to the staggering of the rows of LEDs. Itou further notes that the LED support is made so as to dissipate heat, and that one would add a sufficient number of rows of staggered LEDs in order to be able to have sufficient quantity of radiation for fixing on recording media. Itou further teaches the use of a cam to cause reciprocating motion for the emitting board, i.e. LED array panel, and thereby eliminate variation in quantity of light due to clearance between admitting devices. It would have been obvious to one of ordinary skill in the art to use these teachings of Itou when choosing or designing the suggested LED arrays for use in Young, because they are suggested for use in recording on paper, which is analogous that Young was use in printing processes and provide advantages for uniform application of radiation from LED arrays that would've been consistent with the teachings of the primary references and advantageous therein. It is further noted that claim 5 has been amended to change the "reciprocating or oscillating" requirement to "in an orbital, circular or optical path", however well this is more specific than reciprocating, they are all species of reciprocation, and it would've been a matter of routine experimentation for a competent engineer to determine for a particular apparatus configuration what reciprocation pathway most efficiently & effectively eliminated variation in the quantity of light impinged on the surface requiring uniform radiation. Furthermore, applicant's assertion the Itou is not analogous art, is not agreed with, as the application of light from LEDs to light sensitive materials for the purpose of fixing them, i.e. equivalent to curing, would have been sufficiently analogous for a competent practitioner to recognize the advantages taught in Itou as discussed above, for their expected equally advantageous effects in the teachings of Young, especially as Young only generically discusses their light source configurations.

Alternately, Malinen (abstract; figures 1 & 2a; col. 3, lines 3-22 & 61-67+; col. 4, lines 23-55, especially 46-49; col. 6, lines 34-51; col. 7, lines 50-67) provides teachings to the effect that in LEDs increased temperature can cause decreased intensity and a change of the emitted wavelength, thus provides mechanisms by which the operational temperature of the LED may be maintained during its use, hence it would've been obvious to one of ordinary skill in the art to control the operational temperature of the LEDs as taught by Malinen for the suggested LED arrays of Young, in order to ensure that the optimum in specified curing wavelength for the multistage curing processes are maintaining, and also as a means of controlling the intensity/amount of specific wavelength irradiation in Young to produce desired degrees of curing. Note as Young's process is dependent on use of specific wavelengths to cure depositions with specific photoinitiators, it would've been a matter of competent workmanship to ensure that the employed LEDs maintained their desired parameters (wavelength, intensity, etc.), thus motivating use of techniques of LED control/maintenance of this secondary reference, to enable the optimum performance of Young's teachings. As the effect of heat on LEDs in the wavelength they emit is independent of the intended use of those wavelengths, Malinen need not be using their LEDs for the same purpose as Young, as the teachings of Malinen would've been applicable to any use of LEDs where the importance of maintaining the specific wavelengths was critical to the process in which they were employed.

Alternately, Owen et al. (abstract; figures 2-6; [0029]; [0032-40]; [0052]; claim 13; or in the provisional see pages 4-7 & 10; figure 1) teach high-efficiency solid-state lighting sources, and that may employed LEDs and may be used for photo polymerization, with discussions of light intensity and spatial uniformity, etc., as required for specific applications. Owen et al. note that the power density output (i.e. intensity) is affected by chip array spacing and density, and teach thermal control of the substrate on which the LED chips are mounted, such as via the use of heatsink with fins and fans, and choice of specific wavelength depending on the specific material transformation desired, which will affect the

required power density output. Owen et al. may employ multiple arrays in a module or light bar, where it is taught to move this light source relative to the target or work, such that light uniformity is improved by moving the source, because movement spreads the light output evenly across the work, where various configurations and any motive means necessary to achieve objectives of process are taught to be used. It would've been obvious to one of ordinary skill in the art to apply these concepts to the photo polymerization process of the primary reference for the advantages taught, and because the generically disclosed LED arrays of Young do not provide such details, such that one of ordinary skill would look to known teachings in the art to supply specific details, which Owen et al. provides for analogous uses. Again, a competent practitioner would have recognized that the above principles concerning the use of LEDs as taught in Owen et al. for photopolymerization, would have been expected to be applicable to any photopolymerization process that used LEDs.

For staggered arrays, see Itou (discussed above) or Ignatius et al. (abstract; figures 1-2 & 4 col. 1, lines 6-10 & 65-col. 2, lines 15, 30-49 & 56-col. 3, line 5 & 65-67; col. 4, lines 13-15 & 48-58; col. 5, lines 4-12) or Vackier et al (abstract; figure 1; col. 8, lines 3-62; & col. 9, lines 39-43) all teach the use of staggered LEDs in LED light sources. With respect to Vackier et al., they teach the arrays may be made up of individually staggered LEDs, and that those arrays themselves are staggered, such that the staggered light sources are thereby focused into a continuous line Vackier et al. teach use of this LED array carrier configuration with a print head assembly, hence it would've been obvious to one of ordinary skill in the art to employ LED arrays structured as in Vackier et al. for the generically taught LED arrays of the primary reference, including in the such structured or raise the required multiple wavelengths, because they are analogous uses, and one would look to known art such as Vackier et al. in order to determine useful structures for the generic disclosure, especially considering the ability to create a continuous line of light would have been expected to be useful and appropriate in the assembly-line type process of Young.

Alternately, Ignatius et al. teach configurations for LED arrays arranged in tightly packed structures, where multiple sets of arrays may be configured together, where the number depends on needs of the specific enduse and the illustrations clearly depict staggering of the LEDs from one row to the next. Ignatius at al teaches that the tight packing is desirable for its effects on the intensity output. Also note, the teachings for the ability of using a thermally conductive substrate for the LED arrays, so that it may act as a heatsink. While Ignatius et al.'s preferred use for their LED arrays is as a light source for plant growth or testing, they also teach that their LED arrays may be used for other applications, where the spectral omissions of those arrays would then be selected according to the desired application, hence it would've been obvious to one of ordinary skill in the art to employ LED arrays so configured for their beneficial effects on intensity output, and because the primary reference while teaching use of LED arrays as light sources, does not provide such details so that one of ordinary skill would look to known prior art for construction of taught LED arrays. Again, as the teachings of Ignatius et al. would've been applicable to any use of LEDs where the importance of maintaining the uniformed distribution of wavelengths was important to the process in which they were employed, such that the use or teachings concerning LEDs is what makes these are analogous to Young , who also employs LEDs in a process where light distribution is important.

9. Claims 11-12, 23-24, 28-30 & 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young, in view of Itou or Malinen or Owen et al for constant intensity, and further in view of Itou or Ignatius et al. or Vackier et al. for staggered arrays, as applied to claims 1-6, 10-14,16, 18 & 22-36 above, and further in view of DeMoore et al. (6,807,906 B1).

Claims 11-12 & 23-24 have been amended to require the irradiation of the at least one IR or heat lamp be prior to the irradiation with UV light. DeMoore et al. teach that it is advantageous to employ a heating step, that may employ radiant heat lamps (i.e. IR lamps) before UV curing printed inks, where the IR heater may be placed upstream to preheat the UV ink and coatings, so as to enhance the cure

and smooth the coatings, since it is taught that temperature may be used to increase the cure rate of the UV curable inks, as well as to help smooth the surface of the film. Where it is additionally taught that it is more effective to provide heating upstream from the UV cure units, so that the smoothing effects have time to occur (abstract; figure 1, reference #36 & 38; col. 2, lines 40-42; col. 3, lines 44-67; and col. 4, lines 15-36). Also note use of temperature sensors 42 with the radiant heat lamp assembly, used to control substrate temperature therewith. It would've been obvious to one of ordinary skill in the art to employ such IR lamp heating techniques prior to the UV curing units & after the printing units in the primary reference of Young, in order to effect the taught benefits of increased cure rate, which may save on energy usage, and to provide for the taught smoothing effects, where it is considered desirable, as these advantages would be equally applicable to the UV curable ink printing process of Young.

DeMoore et al. teach a further embodiment, where one may initiate UV cure with a conventional curing lamp (e.g. mercury vapor lamps), before the substrate reaches the main curing unit, as DeMoore et al. teach that this is believed to advantageously improve the efficiency of the main curing unit, thus reducing overall power consumption (figure 1, reference #44 & 10; col. 3, lines 55-65; col. 4, lines 37-55; etc.). Therefore, it would've been obvious to one of ordinary skill in the art that such combinations of an initial conventional UV curing lamp with main curing units would have been applicable to the teachings of Young et al., for the taught advantages to power consumption, especially considering Young mentions the possibility of using other light sources such as lamps, as well as arrays of LEDs (col. 4, lines 20-42 & col. 7, lines 8-22), such that DeMoore et al. provides a specific motivation for combining a conventional UV lamp with Young's main curing source which may be LED arrays. As discussed above, the choice of particular wavelength is again dependent on the particular compositions of the particular inks that are being cured, and in another themselves, the specific claimed wavelengths provide no patentable significance, as they lack any criticality to a generic process or apparatus used for generic process of cure.

Note these teachings may also be considered cumulative to the limitations of new claims 28-30 & 32-34, as well as claims 10 & 22.

10. Claims 28-30 & 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young, in view of Itou or Malinen or Owen et al for constant intensity, and further in view of Itou or Ignatius et al. or Vackier et al. for staggered arrays, as applied to claims 1-6, 10-14,16, 18 & 22-36 above, and further in view of Lewis et al. (5,731,112), optionally considering DeMoore et al. discussed by.

New claims 28-30 & 32-34 have been added to require additional use of a light source that may be a germicidal lamp or emit light at 254 nm, where notices taken that such lamps may be considered a type of fluorescent lamp & that germicidal lamps are known to emit wavelengths at 254 nm.

The above apply the references of combination are not directed to curing at the specific wavelength of 254 nm, or that a specific type of UV lamp is employed in addition to LEDs, however as discussed above additional UV sources from lamps were suggested by the teachings of Young, and it is seen that Lewis et al. (col. 2, lines 34-38; col. 12, lines 1-20; examples, particularly 7, 10, 11 & 13 as described in col. 21, lines 41-43; col. 22, lines 40-45 & 65-col. 23, line 3; and col. 24, lines 14-16) teaches photo polymerizable materials used in forming images, that may be considered to read on inks, where 254 nm UV light of mercury vapor lamps is used to cause photopolymerization of deposited coating material used to form colored images, had showing the known usefulness of this particular wavelength of light for use on materials inclusive of those that would have been expected to be used/effective in the printing & curing process of Young, hence such lamps would have been expected to be included in the type of UV lamps chosen in accordance with Young et al.'s teachings, especially optionally in view of the above teachings of DeMoore et al., who suggest conventional UV curing lamps used in advance of the primary curing zone, which are shown to be mercury vapor lamps emitting 254 nm wavelength light by the present reference.

11. Claims 11-12, 23-24, 25-26 & 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young, in view of Itou or Malinen or Owen et al for constant intensity, and further in view of Itou or Ignatius et al. or Vackier et al. for staggered arrays, as applied to claims 1-6, 10-14,16, 18 & 22-36 above, and further in view of Kumagai et al. (2004/0152038 A1) or Lutz (6,013,330) or Takiyama et al. (4,490,410) for 370 nm wavelengths, and Kumagai et al. (038) or Kamen (2003/0109599 A1) for wavelengths of UV & up to 415 nm., plus Lutz (330) for claims 11-12 & 23-24.

Claims 11-12 & 23-24 have been amended to require [IR] heat lamps before the UV LED curing chamber/zone. New claims 25-26 & 31 require the UV light emitted by the UV LEDs to be visible light at 415 nm or visible light at 415 nm + UV light at 370 nm, and the above applied combination of references are not directed to curing at specific wavelengths (although Owen et al. in [0039] does discuss a chip array for curing with wavelengths between 300-400 nm, or in [0043] wavelengths between 350-425 for other transformation processes, providing the expectation of the availability of LEDs in those wavelengths), or prior IR/heat lamp treatment, and while the specific wavelengths are considered obvious for reasons discussed above, they are further obvious with motivation to employ the specific wavelengths for photocuring in view of the teachings of Lutz abstract; col. 13, lines 20-45+; col. 15, lines 13-30; and examples, col. 15, lines 43-50) who teaches use of UV sources to cure inks printed on a substrate, with the particular mention of 370 nm being useful; or Kumagai et al. (abstract; [0024-28], especially [0024] at the top of page 3 & [0027]; [0042]; and claim 1) who teaches photopolymerization that uses LEDs emitting radiation in the near ultraviolet and/or violet regions, with particular mention of 370 nm as a peak wavelength from the LEDs (note 415 nm = violet visible light); or Takiyama et al. (abstract; examples 7, especially col. 10, lines 25-36), who teach radiation curing of printed patterns on a resin coated body, that are cured or gelled with 370 nm UV radiation; or Kamen (abstract; [0003]; [0068-72], especially [0069]; and claims 21-22 & 23) who teaches curing of inks that have the property of blocking UV radiation, with wavelengths that preferably start at 300 nm UV radiation and range of up to 415 nm,

thus are inclusive of both the 370 & 415 nm radiation is in the curing teachings, although only 415 nm is specifically mentioned. It would've been obvious to one of ordinary skill in the art to employ in the LEDs of Young et al. any UV wavelength known for curing, depending on the specific composition of the specific inks used, especially if the wavelength(s) was (were) known for curing printing inks, which is what Young intends to cure, and/or if the wavelength was known for photocuring processes supplied by LEDs as the light source, as such wavelength have been shown to be effective for Young's intended use &/or from their intended light source for sufficiently analogous purposes.

It is further noted that let's et al. provides another reason for which it is desirable to employ IR heat lamps after printing, but before UV cure, specifically noting on col. 13, lines 20-26 that it can be desirable to flash evaporates solvents from the printed inks after they are printed on the substrate, but before UV curing takes place, hence depending on the particular compositions of inks employed when doing the process of Young, it would've been obvious to one of ordinary skill in the art to employ such a flash evaporation technique, and hence IR heat lamps, in order to remove remaining undesirable solvents, so that effective UV curing can take place.

12. Powers et al. (6,528,955 B1; col. 2, lines 14-25 & col. 8, lines 30-40) & Takashi et al. (2000/0175299 A1; [0071]) are cited as teaching references for showing that germicidal lamps are a type of fluorescent and/or mercury vapor lamps, which are known to provide radiation at 254 nm.

Biegelsen et al (6,536,889 B1) remains substantially similar to Young, and may be considered substantially equivalent for the claims, as section 7 of the 2/1/05 action.

Allard et al. (6949591 B1) is of interest for teaching coating materials that are cured by a dual curing process, that may use application of thermal energy via IR lamps to begin the cure, followed by actinic radiation, that is preferably UV radiation to end the cure (abstract; col. 2, lines 56-63 & col. 13, lines 56-col. 14, lines 53). Kawada et al. (4,910,107) provides further teachings on the use of 254 nm wavelengths for curing of colored compounds.

The publications to Iwase (2005/0099478 A1), Yokoyama (2004/0114016 A1; [0079] fluorescent lamps with peak wavelengths at 254 or 315 nm), Masumi et al. (2004/0189773 A1), Sampson (2006/0233501 A1) & Oshima et al. (2006/0007290 A1) are of interest for showing the state-of-the-art relevant to the claims, but are not prior art.

Other previously noted art of interest include two patent application publications to applicant (2005/0104946 A1 & 2005/0222295 A1); Kovac et al (6200134 B1, especially abstract figures 3-4 col. 7, lines 39-, line 11+) who illustrates staggered LED arrays and discusses temperature control; Powell et al. (2004/0156130 A1) who uses an array of microlenses to homogenized or affect a substantial uniform intensity from light sources that may be inclusive of LED arrays; and Brukilacchio (2003/0218880 A1) who teaches high intensity, spatial uniformity for a white light LED optical system, although teaches a spot curing light [0229] as an alternative embodiment for its multi-wavelength LED array illumination system.

13. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 3-6, 13, 16, 18, 25-27, 31 & 35-36 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-11 of copending

Application No. 11/342,165 (2006/0127594 A1). Although the conflicting claims are not identical, they are not patentably distinct from each other because they have overlapping scopes, where the claims include the limitations in different orders with respect to independent and dependent claims, with different paraphrasing, with the copending (165) application having more detailed claims to the coating material, such as inclusive of use of photoinitiators, or particular uses, however these differences are encompassed by the broader more generic limitations of the present claim with respect to the UV curable. The variations in scope and language choice are considered to be obvious variations, where the broader limitations encompass the narrower limitations.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

14. Claims 10-12, 22-24, 28-30 & 32-34 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-11 of copending Application No. 11/342,165 in view of DeMoore et al.

The (165) application does not claim the use of additional lamps, either UV or IR lamps, with the UV LEDs for curing, however as discussed above DeMoore et al. provides motivation for using either or both IR or UV lamps before printed ink entered is a main UV cure zone, hence use of the use of either of these would have been obvious for reasons as discussed above in section 9.

This is a provisional obviousness-type double patenting rejection.

15. Claims 1-6, 10-14, 16, 18, 22-36 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-14 of copending Application No. 11/361,902 in view of Itou or Malinen or Owen et al for constant intensity, and further in view of Itou or Ignatius et al. or Vackier et al. for staggered arrays, as applied to claims 1-6, 10-14,16, 18 & 22-36 above, and further in view of DeMoore et al.

The claims in the (902) application while claiming UV arrays with multiple wavelengths, as well as limitations to "the same intensity", does not claim that the LEDs have staggered rows in their arrays, however as seeing in the secondary references as discussed above such arrangements are old and well-known too be advantageous for use in LEDs for purposes of uniform application of light as claimed, hence would've been obvious for reasons as discussed above. Similarly while the "same intensity" limitations of the (902) application are not identical to the present "generally constant intensity" of the present claims, they are of overlapping scope and would've been further obvious for reasons as discussed above in the secondary references. Furthermore, the (902) application does not claim the use of additional lamps, either UV or IR lamps, with the UV LEDs for curing, however as discussed above DeMoore et al. provides motivation for using either or both IR or UV lamps before printed ink entered is a main UV cure zone, hence use of the use of either of these would have been obvious for reasons as discussed above in section 9.

16. Applicant's arguments filed 8/14/2006 and discussed above have been fully considered but they are not persuasive.

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 8:30 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MLP/dictation software
10/23-24 & 26-27 /2006

MARIANNE PADGETT
PRIMARY EXAMINER